Application of Quality Improvement (QI) for antibiotic stewardship

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“Premature deaths associated with preventable harm to patients was estimated at more than 400,000 per year.”

Imagine a fully loaded Boeing 747 crashing every day of the year with no survivors, then you can begin to understand the number of preventable deaths that occur in our healthcare system.
Antibiotic Stewardship: HOW?
The Quality Pioneers

W. Edwards Deming
(1900 - 1993)

Walter Shewhart
(1891 – 1967)

Joseph Juran
(1904 - 2008)
Combining two Types of Knowledge

**Subject Matter Knowledge**

Increase the likelihood that changes made result in real sustainable improvement

**Improvement Science**

MORE Improvement: Learn to combine Subject Matter Knowledge and Improvement Sciences in creative ways to develop effective changes for improvement.
A Model for Learning and Change

When you combine the 3 questions with the PDSA cycle, you get...

...the Model for Improvement.

The Improvement Guide, API, 1996
Developing the CDC/IHI Antibiotic Stewardship Framework

- **IHI/CDC partnership**: develop a conceptual framework and driver diagram to describe highly leveraged system components for improving antibiotic utilization for use in hospitals across the country.

- **Goal**: a practical change package focusing on the key things we’d recommend every healthcare organization in America to at least try to do to improve patient care and save money related to antibiotic utilization.
Antibiotic Stewardship Driver Diagram

Primary Drivers

Timely and appropriate initiation of antibiotics

Appropriate administration and de-escalation

Data monitoring, transparency, and stewardship infrastructure

Availability of expertise at the point of care

Secondary Drivers

- Promptly identify patients who require antibiotics
- Obtain cultures prior to starting antibiotics
- Do not give antibiotics with overlapping activity or combinations not supported by evidence or guidelines
- Determine and verify antibiotic allergies and tailor therapy accordingly
- Consider local antibiotic susceptibility patterns in selecting therapy
- Start treatment promptly
- Specify expected duration of therapy based on evidence and national and hospital guidelines

- Make antibiotics patient is receiving and start dates visible at point of care
- Give antibiotics at the right dose and interval
- Stop or de-escalate therapy promptly based on the culture and sensitivity results
- Reconcile and adjust antibiotics at all transitions and changes in patient’s condition
- Monitor for toxicity reliably and adjust agent and dose promptly

- Monitor, feedback, and make visible data regarding antibiotic utilization, antibiotic resistance, ADEs, C. difficile, cost, and adherence to the organization’s recommended culturing and prescribing practices

- Develop and make available expertise in antibiotic use
- Ensure expertise is available at the point of care

Leadership and Culture
<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare-associated <em>C. difficile</em> infections</td>
<td>• Rate of healthcare-associated <em>C. difficile</em> per 10,000 pt. days</td>
</tr>
<tr>
<td></td>
<td>• When <em>C. diff</em> is a &quot;rare event&quot;: days (or admissions) between</td>
</tr>
<tr>
<td></td>
<td><em>C. diff</em> associated disease</td>
</tr>
<tr>
<td>Pharmacy cost for antibiotics</td>
<td>• Total Pharmacy cost for antibiotics per month</td>
</tr>
<tr>
<td></td>
<td>• When census is variable: Pharmacy cost for antibiotics per</td>
</tr>
<tr>
<td></td>
<td>discharge per month</td>
</tr>
<tr>
<td>Antibiotic-related adverse drug events (ADEs)</td>
<td>Currently not feasible method</td>
</tr>
<tr>
<td>Antibiotic resistant healthcare associated pathogens</td>
<td>Percent of antibiotic resistant healthcare-associated pathogens</td>
</tr>
<tr>
<td></td>
<td>(prevalence) (note: targeting pathogens based on local</td>
</tr>
<tr>
<td></td>
<td>circumstances, i.e., MRSA, VRE, etc.)</td>
</tr>
<tr>
<td>Primary Driver</td>
<td>Measure</td>
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<tr>
<td>---------------</td>
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<tr>
<td><strong>Timely antibiotic management</strong></td>
<td><strong>Recommended measures, based on pilot testing:</strong></td>
</tr>
</tbody>
</table>
|  | • Percent of patients where cultures were obtained prior to first dose of antibiotics  
|  | • Percent of patients sampled where antibiotic start date was documented/visible at the point of care  
|  | • Percent of patients sampled where antibiotic stop date/duration was documented/visible at the point of care  
|  | • Percent of patients sampled where antibiotic indication was documented/visible at the point of care  
|  | • **COMPOSITE MEASURE:**  
|  | Percent of patients sampled where antibiotic start date, stop date/duration and indication were documented/visible at the point of care |
| **Appropriate administration and de-escalation** |  |
| **Data Monitoring, Transparency and Stewardship Infrastructure** | **Suggested measure for consideration:**  
|  | Percent of clinicians responding positively to a survey on their receipt or knowledge of selected antibiotic information (e.g. antibiotic utilization, antibiotic resistance, *C. difficile* rate, cost associated with antibiotics, adherence to organization prescribing practices).  
| **Availability of Expertise at the point of care** | **Suggested measures for consideration:**  
|  | • Percent of providers who can state how to secure expertise pharmacology and antimicrobial spectrum  
|  | • Percent of cases sampled where expertise was available at the point of care |